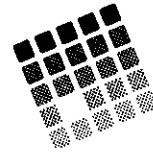


# **EXHIBIT 6**

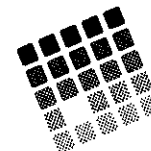


## EXPERT REPORT

### W.R. Grace Asbestos-Containing Construction Products: A Review of Asbestos Types, Source and Libby Vermiculite

Dr. William E. Longo

Report Date: December 29, 2008



## QUALIFICATIONS

William E. Longo, Ph.D.

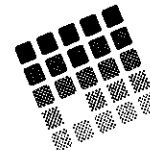
I have a Bachelor of Science degree in Microbiology, a Masters of Science in Engineering and a Doctoral of Philosophy in Material Science and Engineering, all from the University of Florida. After receiving my Ph.D. in 1983, I remained at the University of Florida and became a visiting Assistant Professor in 1985 in the Material Science & Engineering Department. While at the University of Florida, my research included the characterization of cancer drug targeting molecules by electron microscopy. From this research, I hold a patent for the synthesis of protein microspheres for the drug targeting applications.

In 1983, I founded Micro Analytical Laboratories (MAL) Inc., which became one of the first commercial labs in the country to provide Transmission Electron Microscopy (TEM) analysis of asbestos-containing air, bulk and dust samples. I left MAL in 1987 to become President of Materials Analytical Services (MAS), Inc. headquartered in Atlanta, Georgia. In addition to Atlanta, MAS has an office in Los Angeles, California. MAS specializes in the characterization of materials for the following industries: Environmental, Industrial Hygiene, Building and Construction Products and VOC emission testing.

Currently, over 10% of MAS's staff has their Ph.D.'s in various scientific disciplines. The technical group at MAS includes Industrial Hygienist, Certified Industrial Hygienists, geologists, biologists, microbiologists, environmental chemists, material scientists and VOC chemists. The MAS laboratory in Atlanta contains state-of-the-art analytical equipment as well as various types of electron and optical microscopes.

In the past, MAS has provided laboratory analysis and consulting services to a wide range of private, public, and government entities. These groups include NASA, the Center for Disease Control, NBC, the University of Tokyo, IBM, FAA, GSA, NATO, the National Institutes of Health, W.R. Grace, Celotex, Intel, and the EPA, to name a few. MAS has extensive experience over many years in the analysis of bulk samples of asbestos for purposes of performing micro-analytical product identification. MAS performed this analysis on thousands of bulk samples of asbestos containing fireproofing and acoustical material ("Surface treatment ACM") for a variety of companies. MAS was selected as an Approved Laboratory by several bankruptcy trusts. MAS also provided product identification analysis for the State of Hawaii, State of Texas, State of Utah, State of New York, the City of New York, City of Boston, and the Port Authority of New York and New Jersey.

The product identification consulting work I have performed was in the context of litigation and involved the materials characterization of unknown surface treatment ACM. Typically, such analysis requires that a bulk sample of ACM be analyzed with a variety of analytical techniques to determine the constituent ingredients and their proportionality, which are then



compared to the manufacturers' known formulas as well as to information regarding application techniques which may have varied with the formulas or products. While performing this type of analytical work I was provided with all of W.R. Grace's asbestos-containing construction product formulations as well as ingredient information that included the source of their chrysotile asbestos.

MAS and I have also provided consulting and analytical services to former asbestos manufacturers, including W.R. Grace's Construction Products Division. This work involved a request by W.R. Grace that MAS analyze air samples collected by Grace during the spraying of Fireproofing for tremolite/actinolite airborne fiber levels.<sup>1</sup> W.R. Grace sought to learn whether the tremolite/actinolite contamination in the vermiculite would become airborne during the spraying process. Because of the overloading of the air samples by the vermiculite, the W.R. Grace Representatives requested that all the air samples be analyzed by the indirect method. The analysis was carried out as requested and tremolite/actinolite asbestos fibers were found. This work was not done for litigation purposes.

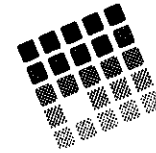
I was a member of the Environmental Protection Agency (EPA) Peer Review Group, which consisted of five members who peer reviewed the EPA's findings in their ongoing asbestos research with regard to asbestos in building issues. The Peer Review Group provided the EPA with guidance for their continuing asbestos research, and with insight regarding new issues that needed to be addressed. I was also a member of an EPA panel that drafted the Micro-Vacuum ("Microvac") Asbestos Dust Method in 1989, which measured asbestos surface contamination. I served as both Vice Chairman and Chairman of the TEM Analytical Committee for the National Asbestos Council ("NAC"). I am the primary author of the American Society for Testing and Materials (ASTM) D-5755-95 Dust Sampling Method for the Quantification of Asbestos Surface Contamination ("ASTM D-5755 Dust Sample Method") that was approved and promulgated as an ASTM standard method in 1995. For my leadership role in developing the ASTM dust method, I was presented an Award of Appreciation by the D-22 Committee on Sampling and Analysis of Atmospheres.

I have been qualified as an expert in both State and Federal court with regard to the use of optical and electron microscopy for the characterization of asbestos-containing products, as a material scientist, and electron microscopist, and an industrial hygienist relating to asbestos issues.

My opinions which are described in this report are based on my experience as a materials characterization scientist, my review of the scientific literature and the data, tests and other information which are reviewed, discussed and referenced in this report. I have footnoted representative examples of documents that support my opinions. I may utilize various slides and charts as well as photomicrographs and demonstrative aides and videos during

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<sup>1</sup> John J. Henningson, W.R. Grace & Co., personal communication. William E. Longo, Ph.D., Materials Analytical Services, Inc., personal communication.

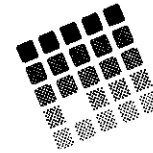


my testimony. I reserve the right to add to these opinions as appropriate and to address views expressed in the expert reports of any other opposing experts within my area of expertise. These opinions are expressed to a reasonable degree of scientific certainty. My billing fee for consulting, depositions, and trial testimony is \$300.00 per hour.

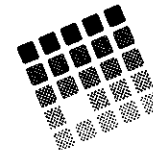
## **OPINIONS**

### **Executive Summary of Opinions**

1. A review of W.R. Grace Interrogatories and their construction product formulations for the 1940's, 1950's, 1960's and early 1970's, shows that Grace used primarily 7M chrysotile asbestos in their fireproofing, acoustical plaster and surface texture materials.
2. The 7M designation comes from the Quebec asbestos grading system. The grading system runs from Group 1 through Group 9. Group 7 is designated as chrysotile shorts and floats. The W.R. Grace asbestos-containing construction product formulations call for 7M grade chrysotile asbestos.
3. The Quebec region in Canada includes the Thetford mine and lake area. This region is responsible for the majority of chrysotile and mining industry in Canada.
4. The chrysotile deposits in the Quebec region are contaminated with various amounts of tremolite/actinolite amphibole asbestos. This contamination is found in the serpentine rock and is transferred to the chrysotile fibers during the mining and processing operations. Asbestos-containing products that contain Canadian chrysotile will be contaminated with tremolite/actinolite asbestos fibers.
5. W.R. Grace has provided information that shows that they primarily purchased the chrysotile they used in their construction products from Johns-Manville, Carey Canada and National Gypsum Companies. All three of these suppliers answered interrogatories that verify that the source of chrysotile asbestos that they sold was from Canada. As stated earlier, the Canadian chrysotile they supplied to W.R. Grace is contaminated with tremolite/actinolite asbestos fibers.
6. Product formulation and batch sheets in my possession for W.R. Grace's asbestos-containing construction product formulations contain all the various ingredients for W.R. Grace's acoustical plasters, surface textures and fireproofing products. There are approximately 34 separate formulas that contain chrysotile asbestos in a concentration range at the lower end of 1 to 4% by weight to an upper end amount of 41 to 46% by weight. Each of these products that contain Canadian chrysotile would also have trace amounts of tremolite/actinolite.



7. W.R. Grace purchased the Zonolite Company in the early 1960's. The purchase of the Zonolite Company included the vermiculite mine in Libby Montana. It has been well documented that this vermiculite mine was the primary source of the vermiculite in many of W.R. Grace's chrysotile containing construction products including the Monokote-3 fireproofing material.
8. The W.R. Grace Libby Montana vermiculite mine was also known to have significant amounts of tremolite/actinolite contamination. The Libby mine tremolite problem was well known to W.R. Grace. In my opinion, W.R. Grace should have known that when they used Libby vermiculite in their construction products, they were putting tremolite asbestos in those products as well.
9. Of the 34 chrysotile-containing products that W.R. Grace and the Zonolite Company manufactured, 18 contained significant amounts of Libby Montana vermiculite. These chrysotile-containing products therefore contained tremolite/actinolite from both the vermiculite and Canadian chrysotile.
10. The spraying or application of W.R. Grace's Libby vermiculite will generate significant amounts of airborne tremolite fibers. A study by W.R. Grace in 1988 of a non-chrysotile/vermiculite product generated 0.44 f/cc of tremolite during the spraying of their product.
11. The application (mixing and spraying) of W.R. Grace's asbestos-containing construction products will result in exposure to elevated airborne levels of chrysotile and tremolite/actinolite asbestos fibers for workers who are performing hands-on work with the products, as well as for bystanders in the area.
12. All of W.R. Grace's in-place asbestos-containing chrysotile construction products are deemed friable as defined by the Environmental Protection Agency (EPA). That is, they can be crushed with hand pressure and produce a visible powder. Therefore, any individual who disturbs these in-place materials will have exposures to airborne chrysotile and tremolite/actinolite asbestos fibers.
13. W.R. Grace Vermiculite product was primarily mined in Libby, Montana. Typically, before W.R. Grace used this vermiculite in their construction products, it was expanded in various processing plants around the country. These expander plants processed the vermiculite concentrate into its final form which was then used in an array of building materials. Since the Libby vermiculite ore was contaminated with asbestiform tremolite, each of these expander plants and facilities would be contaminated with tremolite asbestos.



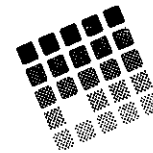
## I. W.R Grace Asbestos-Containing Construction Products

As stated earlier I have been involved in numerous property damage cases where the plaintiffs (school board, hospital, States, etc.) have sued former asbestos manufacturers for recovery of funds to deal with their in-place asbestos-containing construction products. Our primary role in those cases was to perform product identification. We were to determine who the manufacturer of these in-place products (fireproofing, acoustical plasters and surface texture materials) was. Typically, through court order, all the former manufacturers of asbestos-containing construction products produced their formulations of all the products they sold in the 1940's, 1950's, 1960's and early 1970's to the plaintiffs and ultimately to me. With these formulations, our laboratory was able to develop analytical methods (based on scientifically accepted methods in my field) to identify who a particular manufacturer was for a given surface treatment sample (fireproofing, acoustical plaster, surface texture, etc.). W.R. Grace's formulation was included with this information. A typical W.R. Grace formula contains approximately 34 separate products that contain chrysotile asbestos.<sup>2</sup> A summary of these products is shown in Table 1.

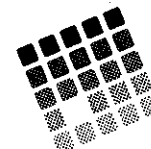
**TABLE 1**

PRODUCT		CHRYSTILE AMOUNT	DATE OF MANUFACTURE
1.	Zonolite Acoustical Plastic	15-19%	1945 – 1972*
2.	Board of Education Hard Texture	9-12%	1962 – 1963
3.	Board of Education Texture	9-12%	1962 – 1963
4.	Ari-Zonolite Board Texture	10%	Approx. 1961 – 1963
5.	Econo-White Acoustical	13-17%	1956 – 1970
6.	Zonolite Finish Coat	11-14%	1950 – 1973
7.	Hi-Sorb Acoustical Plaster	8-10%	1966 – 1971
8.	Oyster White Hi-Sorb	8-10%	1967 – 1973
9.	Hi-Temp Insulating Cement	15-19%	1938 – 1970
10.	Zonolite Mono-Kote – 1	10-13%	1959 – 1963

<sup>2</sup> State of Hawaii vs. W.R. Grace & Co. – Conn. A Connecticut Corporation et al. Civil No. 93-4161-10. Jefferson Parish School Board et al vs. W.R. Grace & Company.



11.	Zonolite Mono-Kote – 2	10-13%	1959 – 1973
12.	Zonolite Mono-Kote – 3	10-14%	1959 – 1973
13.	Perltex Super-40 Fog	4-7%	1966 - 1973
14.	Perltex Spray Surfacers	6-13%	1966 – 1973
15.	Perltex Super-40 Perlite	6-8%	1966 - 1973
16.	Perltex Super-40 Polycourse	1-6%	1966 – 1973
17.	Perltex Super-40 SAV	5-7%	1966 – 1973
18.	Zonolite Spra-Tex (Regular)	30-36%	1955 – 1972
19.	Zonolite Spra-Tex (Extra Hard)	29-35%	1955 – 1972
20.	Spra-Wyt	16-20%	1954 – 1973
21.	Versakote	5-7%	1966 – 1973
22.	Z-TEX	13-17%	1958 – 1962
23.	Zono-Coustic 1	11-14%	1960 – 1973
24.	Zono-Coustic 2	10-13%	1959 – 1973
25.	Zono-Coustic 3	11-14%	1959 – 1973
26.	Zono-Coustic Z	11-14%	1959 – 1973
27.	Perlcoustic	15-17%	UNKNOWN+
28.	Perltex Prep Coat #3	4-5%	UNKNOWN+
29.	Prep Coat #5	5-7%	UNKNOWN – 1973+
30.	Satin White	13-17%	UNKNOWN+
31.	Ari-Zonolite Natural	15-19%	UNKNOWN+
32.	Ari-Zonolite Oyster White	28-32%	UNKNOWN+



33.	Ari-Zonolite Nu-White	41-46%	UNKNOWN+
34.	Zonolite Finishing Cement	21-26%	UNKNOWN+

+These W.R. Grace formulas did not provide dates of manufacture for these products.

W.R. Grace asbestos-containing construction products were widely sold and used in buildings across the United States. I base this statement on my 17 years of personal experience in performing product identification on thousands of asbestos-containing building samples from across the country by using the various manufacturers supplied documentation and formulas. I determined that the asbestos-containing fireproofing and acoustical plaster products supplied by W.R. Grace were used in the majority of the buildings that we tested at our laboratory.

## II. Quebec, Canada

Most of the asbestos mining in Canada has taken place in the province of Quebec. In the 1950's, 1960's and early 1970's Quebec had 10 of the 13 chrysotile mines in Canada. The Thetford Mines region contained most of these mines (10 out of 13). The largest of these mines was the Jeffrey mine that was owned by Johns-Manville until 1983.<sup>3, 4</sup> Up until the mid 1970's Canadian mines supplied more than half of the world's demand for chrysotile.<sup>5</sup>

## III. W.R. Grace Chrysotile came from Canada

I have examined answers to interrogatories and of W.R. Grace documents, including batch sheet formulations, and answer to interrogatories, and my review of these papers shows that the three principal suppliers of chrysotile used in Grace's asbestos-containing construction products were Johns-Manville, Carey Canada and National Gypsum.<sup>6, 7, 8</sup>

<sup>3</sup> Article from April 1939 issue of Canadian Ministry and Johns-Manville Articles.

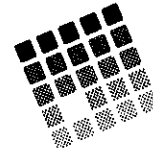
<sup>4</sup> Government of Quebec website at [www.mrnfp.gouv.qc/mines/Quebec-minier](http://www.mrnfp.gouv.qc/mines/Quebec-minier)

<sup>5</sup> Mineral Commodity Profiles – Asbestos. U.S. Department of the Interior, U.S. Geological Survey, Reston, Virginia: 2005.

<sup>6</sup> John D. McDaniel et al vs. Johns-Manville Corp. United States District Court of Illinois, Eastern Division Cause 5 No. 77C 3534.

<sup>7</sup> Emil A. Pfannebecker et al vs. Johns-Manville Corp. United States District Court of Illinois, Eastern Division, Cause No. 80-694C.

<sup>8</sup> In the United States District Court for the Northern District of Oklahoma in Re: Asbestos Personal Injury Cases. Cause No. M-1417 SB-128



1. Johns-Manville: Canadian Johns-Manville sold chrysotile asbestos for many years from its Jeffery mine facility until 1983.
2. Carey Canada: Carey Canada was incorporated in Quebec Canada in 1955 and began operations in 1958. Carey Canada mined chrysotile from 1958 until well past 1972. After 1972 W.R. Grace no longer added chrysotile to a majority of their asbestos-containing surface treatment products.
3. National Gypsum: National Gypsum Company sold chrysotile asbestos fiber, to W.R. Grace and other companies, from July 1958 until October 1974. Until September 1973, this asbestos fiber was obtained from National asbestos Mines, Ltd., a wholly-owned subsidiary of National Gypsum (Canada) Ltd., a wholly-owned subsidiary of National Gypsum Company. National Asbestos Mines, Ltd., was located in Thetford Mines, Quebec.

W.R. Grace also stated that they were supplied with chrysotile asbestos from Pacific Asbestos and the G. Wilson Company. There is no indication from the formulation batch sheets that these two asbestos fiber suppliers were ever used to any great extent by W.R. Grace.<sup>9, 10</sup>

#### IV. Tremolite Contamination of Canada Chrysotile

It has been documented that amphibole contamination (tremolite/actinolite and sometimes anthophyllite) can be found in chrysotile mines located in Canada.<sup>11, 12, 13</sup> The amphiboles are typically found in the non-asbestos serpentine rock that is surrounding the chrysotile fiber veins. Because of the location of the amphibole contaminants in relation to the chrysotile, it is typically not possible to differentially remove only the chrysotile vein deposits and completely avoid the contaminated serpentine rock on large-scale mining operations.

It has been suggested that amphibole contaminants at chrysotile mines are reduced to non-detectable levels by two methods. The first one is that areas of the mine that contained the amphibole contaminant are somehow avoided during mineral extraction by selective mining

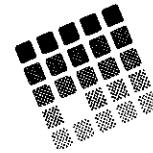
<sup>9</sup> W.R. Grace production for the State of Utah.

<sup>10</sup> Chicago Board of Education v. AC&S, W.R. Grace Production.

<sup>11</sup> Williams-Jones, E.E., Normand C., Clark, P., Vali, H., and Martin, F.R., "Controls of Amphibole formation in Chrysotile Deposits: Evidence from the Jeffrey Mine, Asbestos, Quebec". The Health Effects of Chrysotile Asbestos: Contribution of Science to Risk-Management Decisions, Can., Mineral., Spec., Publ. 5, pp. 80-104 (2001).

<sup>12</sup> Notes on a meeting between Doctors Elmes, Hodgson, and Browne representing the Asbestos Research Council and Sir Newille Stack, Directory General of the Asbestos International Association to discuss aspects of the problem of tremolite contamination of asbestos fibre (November 22, 1984).

<sup>13</sup> Browne, K., "Chrysotile Threshold of Risk" presented at an International Seminar on : Safety in the Use of Chrysotile Asbestos: Basis for Scientific Based Regulatory Action, Havana, Cuba. September 2001.



procedures and the second method is that ore is processed in such a way that the amphibole contaminants are removed.<sup>11</sup> The details of how this process can remove amphibole fibers from chrysotile fibers have not been explained, nor have they been supported by any published scientific studies. In regards to the selective mining techniques, it is unclear if this process is being used today at any ongoing mining operations in Canada. However, our analytical studies with pre-1990 asbestos-containing products that contain Canadian chrysotile have shown the presence of small amounts of tremolite/actinolite contaminants on numerous occasions.<sup>14, 15</sup>

Research by others has pointed to tremolite contamination in Canada chrysotile. This research involved the examination of lung tissue from chrysotile miners and showed significant amounts of tremolite in their lungs. Published work by Dr. Bruce Case in 1991 and 1994 states, "It is possible that chrysotile is always associated with some degree of tremolite (and often other amphiboles commercial and non-commercial) if exposure has been long enough and it is looked for (in the lung) hard enough."<sup>16, 17</sup> Dr. Graham Gibbs, is a geologist, who concurred that tremolite is associated with Canadian chrysotile when he stated in his published work that the process of how the chrysotile is mined does not remove the tremolite contamination.<sup>18</sup> In Dr. Andrew Churg's published paper entitled "Chrysotile, tremolite, and malignant mesothelioma in man" he determined that large amounts of tremolite can be found in exposed workers who manufactured chrysotile product.<sup>19</sup> This is further proof that tremolite contamination in chrysotile ends up in manufactured chrysotile products. The fact that tremolite is found in the lungs of chrysotile miners is strong evidence that chrysotile has tremolite as a contaminant.

The small amounts of tremolite/actinolite found in chrysotile are normally not detected using the EPA recommended standard analytical techniques for asbestos analysis.<sup>20</sup> The EPA method uses polarized light microscopy (PLM) and would typically have a detection limit for asbestos of about 0.5% when contained in a construction product like fireproofing or acoustical plasters. A tremolite concentration of less than 0.5% would not be detected using PLM.

Others have addressed this issue concerning the detection of tremolite/actinolite in chrysotile ore and the problems associated with the masking effect of the chrysotile. A chemical extraction method increasing the tremolite/actinolite detection limit by removing

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<sup>14</sup> Detection of Amphibole Asbestos in Chrysotile Sheet Gaskets: Materials Analytical Services, Inc., April 2002.

<sup>15</sup> Detection of Amphibole Asbestos in Chrysotile Brake Linings: Materials Analytical Services, Inc., June 2000, Revision June 2005.

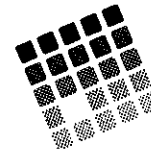
<sup>16</sup> Case, B.W., "Health Effects of Tremolite, Now and in the Future", NYAS 643:491-504 (1991).

<sup>17</sup> Case, B.W., "Biological Indicators of Chrysotile Exposure", Ann. Occ. Hyg. 38:503 (1994).

<sup>18</sup> See Deposition of Dr. Graham Gibbs taken on December 16, 2000 in King vs. Allied Signal, 24242-C03 pp 14-22.

<sup>19</sup> Churg, A., "Chrysotile, Tremolite, and Malignant Mesothelioma in Man", Chest, 93:621-628 (1988).

<sup>20</sup> U.S. Environmental Protection Agency, "Method for the Determination of Asbestos in Bulk Building Materials", Test Method, EPA/600/R-93/116, July 1993.



the chrysotile was first proposed by Dr. A.A. Hodgson in 1984 at a joint meeting of the Asbestos Research Council and the Asbestos International Association.<sup>12</sup> Addison and Davis published this method in 1990 to dissolve most of the interfering chrysotile.<sup>21</sup> They reported increasing the tremolite/actinolite detection limit by a factor of 10 when using X-ray diffraction and an acid/base digestion procedure. Our own research at MAS using the Addison and Davis method coupled with transmission electron microscopy analysis has resulted in an increase of the tremolite/actinolite detection limit by a factor of 100 to 1000. Using this increased tremolite detection method we were able to detect small amounts of tremolite in chrysotile products, such as brakes and gaskets, that were previously analyzed by the standard EPA method (PLM) and no tremolite was detected.<sup>14, 15</sup> The reason that electron microscopy/digestion method protocol is more sensitive for small amounts of tremolite than PLM is that the digestion process removes the interfering chrysotile component of the sample and electron microscopy is superior to PLM in the detection of single tremolite fibers.

#### **V. W.R Grace Asbestos-Containing Construction Products are Contaminated with Tremolite from Chrysotile**

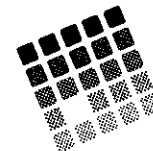
As described above, W.R. Grace primarily used Canadian chrysotile from Canada for its asbestos-containing construction products, and Canadian chrysotile has been shown to be contaminated with tremolite asbestos. Therefore, when W.R. Grace used Canadian chrysotile as an ingredient in their construction products they were also adding tremolite asbestos to their material. As will be discussed later in this report, asbestos exposures to workers from Grace products include not only chrysotile but airborne exposure for tremolite/actinolite fibers as well.

#### **VI. W.R. Grace & Libby, Montana Vermiculite**

In addition to chrysotile asbestos, another major ingredient used in a W.R. Grace's asbestos-containing construction products is vermiculite that was mined from Libby, Montana.<sup>2</sup> W.R. Grace put this material in 18 of the 34 products listed in Table 1. The range of Libby vermiculite concentrations used was from 11 to 12% to an upper amount of 75 to 85%. A review of the Grace asbestos-containing Libby vermiculite products are shown in Table 2.

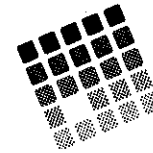
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<sup>21</sup> Addison, J. and Davies, L.S.T. "Analysis of Amphibole Asbestos in Chrysotile and Other Minerals", Ann. Occup. Hyg. Vol 34, 2 pp. 159-179, 1990.

**TABLE 2**

**VERMICULITE CONCENTRATION OF W.R. GRACE PRODUCTS  
LOBBY MONTANA**

PRODUCT		VERMICULITE AMOUNT
1.	Zonolite Acoustical Plastic	60-70%
2.	Ronolite Finish Coat	63-72%
3.	Hi Temp Insulating Cement	60-70%
4.	Zonolite Mono-Kote-1	40-45%
5.	Zonolite Mono-Kote-2	41-46%
6.	Zonolite Mono-Kote-3	28-32%
7.	Zonolite Spra-Tex	14-19%
8.	Z-Tex	24-28%
9.	Zono-Coustic 1	75-85%
10.	Zono-Coustic 2	41-46%
11.	Zono-Coustic 3	34-38%
12.	Zono-Coustic Z	38-42%
13.	Perltex Prep Coat #3	11-12%
14.	Prep Coat #5	18-22%
15.	Satin White	46-53%
16.	Ari-Zonolite Natural	55-60%
17.	Ari-Zonolite Oyster White	38-42%
18.	Zonolite Finishing Cement	22-27%



In 1963 W.R. Grace purchased the Zonolite Company, which included their vermiculite mine in Libby, Montana. It has been shown that this mine contained as much as 40% amphibole asbestos (tremolite/actinolite).<sup>22, 23</sup> The vermiculite deposits at W.R. Grace's Libby mine are mainly located in a mountain 4,200 feet high called the "Zonolite Mountain".<sup>24</sup> W.R. Grace used huge power shovels to extract the rocky material from Zonolite Mountain. The material was hauled to a primary plant at the edge of the deposit, where the larger rocks were removed. The smaller material was then transported to the mill where it was blended and fed into a series of crushers, screens and water floatation tables to remove rock and other foreign matter. The milled material was then dried in large rotary kilns and screened into six closely graded sizes for various end uses. The grades ranged from 0 to 5 with 0 being the largest and 5 being the smallest.

The unexpanded raw vermiculite ore was shipped by rail to the various expanding plants around North America. At the plant, the material was fed into a furnace and heated to 2,000 degrees Fahrenheit. The expanded vermiculite was then used as filler in Grace's construction products as outlined in Table 2 of this report. As discussed in the next section, the expanded vermiculite from Libby was known by W.R. Grace to be contaminated with tremolite/actinolite.

## **VII. Tremolite Contamination of Libby Vermiculite**

W.R. Grace has documents that I have reviewed which demonstrate that the Libby, Montana vermiculite they were using in their construction products was contaminated with tremolite asbestos. There are a large number of Grace internal documents that are, in my opinion, the best evidence that W.R. Grace's Libby vermiculite had an inherent problem with tremolite contamination and that they were aware of it.

A Grace document entitled "Tremolite Fact Sheet" includes some of the earliest measurements of the amount of tremolite found in the Libby, Montana vermiculite mine. These measurements, taken in 1956, showed that the Libby vermiculite ore contained up to 20% tremolite, with an average of 3%. Measurements taken of the vermiculite ore in 1962 found 7% tremolite and 4% tremolite was found in 1983.<sup>23</sup>

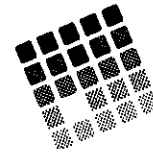
Over a period of almost 30 years, W.R. Grace had data that showed tremolite contamination in the Libby vermiculite mine. Additional W.R. Grace internal memoranda and letters also discussed the problem with tremolite contamination in their vermiculite. A small sampling of these documents is as follows:

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<sup>22</sup> In the Circuit Court of the 11<sup>th</sup> Judicial Circuit in and for Dade County, Florida. In re: Asbestos Litigation, Case No. 91-8000.

<sup>23</sup> W.R. Grace Tremolite Fact Sheet Exh. 1467.

<sup>24</sup> Masonry Magazine, 1962.



A memo written by the Regional Production Manager for W.R. Grace in 1983 states the following: **“Vermiculite concentrate from Libby does contain minute amounts of tremolite which is a form of asbestos”**. The memo goes on to say, **“There are some areas where fibers cannot be eliminated and where an employee may occasionally be required to perform a duty. When this is necessary wearing a respirator is mandatory”**.<sup>25</sup>

In 1978, Henry A. Eschenbach, Director of Health, Safety & Toxicology wrote a letter to Mr. S.V. Chamberlain, Director of Purchasing at O.M. Scott & Sons in which he stated the following: **“As you know, a certain amount of asbestiform tremolite is associated with vermiculite ore which is shipped to your plant from the Libby, Montana mine. We are continually looking for ways to reduce the amount of this contaminant and have made considerable progress in this area”**.<sup>26</sup>

This letter is important because it demonstrates that in 1978 the Libby vermiculite was still contaminated with asbestiform tremolite and they still had not found a way to eliminate the tremolite contamination.

In another correspondence from Eschenbach written in 1977, he acknowledged that even though the amount of tremolite in the vermiculite ore is small, there is the potential to generate significant levels of airborne tremolite levels.<sup>27</sup> Eschenbach stated the following: **“Since a small amount of fibrous material in the ore can give significant amount of airborne fiber, apparently insignificant differences in the mill feed can result in varied fiber counts”**.

Another 1977 W.R. Grace internal memo from H. Duecker to J. Wolter discussed the fact that the tremolite concentration in the Libby vermiculite is not dependent on variables concerning size of the screen fraction or how much vermiculite is in the rock.<sup>28</sup> This memo states the following: **“As can be seen from this data, there is no apparent correlation between screen fraction, percent rock, yield and percent tremolite”**.

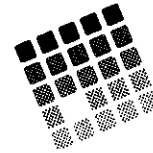
It is clear from W.R. Grace's own documents that there was a tremolite problem in Libby vermiculite ore which they were fully aware of. The numerous letters and memos also prove W.R. Grace's knowledge that the tremolite could not be removed during ore processing and therefore any final product sold to consumers by W.R. Grace that contained Libby vermiculite would be contaminated.

<sup>25</sup> June 7, 1983 Memo from W.R. Wright to Expanding Plant Managers. Subject Fiber Control and Communication.

<sup>26</sup> 1978 Letter from H.A. Eschenbach, Director of Health, Safety and Toxicology letter to S.V. Chamberlain, Director of Purchasing at O.M. Scott & Sons.

<sup>27</sup> March 14, 1977 Memo from H.A. Eschenbach to E.S. Wood

<sup>28</sup> September 27, 1977 Memo from J.W. Wolter to H.C. Duecker. Subject: Rock vs. Tremolite Correlation.



### **VIII. The Mixing, Application and Removal of W.R. Grace Asbestos-Containing Construction Products will Expose Workers to Significant Levels of Airborne Asbestos Fibers**

All of the W. R. Grace asbestos-containing surface treatment products discussed here (fireproofing, acoustical plasters and surface texture materials) were sold as a dry powder that had to be mixed on the job site.<sup>2</sup> These materials were typically sold in 25 to 50 pound bags which would be poured in a hopper and mixed with water. Depending on the application, the slurry of mixture was usually sprayed or towed onto the building surface. The mixing and spraying of these asbestos containing materials would cause significant airborne asbestos fiber exposure to unprotected workers who were working with and around these materials.<sup>29</sup> Additionally, the disturbance or removal of these surface treatment products would release significant amounts of asbestos fibers causing exposure to unprotected workers.<sup>30</sup>

As stated above, W.R. Grace asbestos-containing construction products discussed here are sold in a dry form and require mixing with water before application. The pouring of one bag of asbestos-containing dry product into a hopper can produce airborne fiber exposures in excess of any current and past Occupational Safety and Health Administration (OSHA) excursion limits. If a worker was to perform this activity for any extended period of time (two to four hours), it is my opinion that all current and historical OSHA permissible exposure limits (PEL) would also be violated. This statement is based on our MAS study entitled Monokote Mixing for Gunning Work Practice Simulation Demonstration.<sup>29</sup> In this study one full bag of W.R. Grace Monokote-3 spray fireproofing (chrysotile content 10 to 14% by weight), under controlled conditions, was poured into a hopper. Air measurements using the PCM technique showed fiber levels from 129 to 235 f/bcc. Air measurements taken in by W.R. Grace when Monokote was mixed on actual job sites showed fiber ranged of 0.7 to 7.3 f/cc.<sup>31</sup> This range found by W.R. Grace was much lower than our study but nevertheless still as an exposure level that would violate OSHA's current PEL and excursion limits.<sup>32</sup> W.R. Grace also made asbestos fiber measurements during the spraying of their fireproofing products.

These spraying studies were performed by Grace in the late 1960's and early 1970's at different job sites from around the country. The samples were measured by PCM and were reported in fibers per cc. The range of asbestos fiber exposures found by Grace for Monokote spraying was in the range of 1.1 to 7.5 fibers/cc.<sup>31</sup> At these asbestos fiber levels,

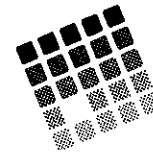
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<sup>29</sup> Monokote Mixing for Gunning: Work Practice Simulation Demonstration, Materials Analytical Services, Inc. March 1998 report and video.

<sup>30</sup> W.R. Grace Monokote-3 Work Practice Simulation Demonstration, Materials Analytical Services, Inc. July 1996 report and video.

<sup>31</sup> W.R. Grace Asbestos Fiber Air Measurements During the Mixing and Spraying of Monokote-3.

<sup>32</sup> The current OSHA PEL is 0.1 f/cc and current excursion limit is 1.0 f/cc. The 1972 OSHA PEL was 5.0 f/cc and the 1972 excursion limit was 1.0 f/cc. See [www.OSHA.org](http://www.OSHA.org).



it is my opinion, that there is the potential that past and certainly the current OSHA PEL and excursion limit would be violated during the spray application of W.R. Grace's asbestos-containing fireproofing products.<sup>33</sup>

As mentioned earlier, the in-place asbestos-containing construction products manufactured by W.R. Grace are deemed friable by the EPA.<sup>33</sup> That is, the hardened materials can be crushed by hand pressure causing the release of asbestos-containing dust. The EPA friability criteria triggers guidelines on the precautions that workers need to have to reduce fiber exposure problems when these materials must be disturbed. These precautions include simple maintenance activities that would have the potential of disturbing in-place W.R. Grace products to abatement procedures to full-scale abatement procedures. In my opinion, if in-place W. R. Grace asbestos-containing construction products are disturbed by a worker without following EPA guidelines then that worker would be exposed to significant levels of airborne asbestos fibers. If the disturbance is significant enough the exposure levels would violate all current and historical OSHA asbestos fiber exposure limits.

Whether or not a given worker has exposure to asbestos fibers from W.R. Grace products, and the duration and extent of such exposure, depends upon the specific individual characteristics of each person's work history and activities. Just because a person works in an industry or an occupation that is not generally associated with exposure to asbestos does not mean that some persons in such occupations were not exposed to asbestos fibers emitted by W. R. Grace's asbestos-containing products.

## **IX. W. R. Grace's Testing of Sprayed Vermiculite Products**

In 1988 W.R. Grace performed air testing for the presence of airborne tremolite/actinolite fibers when their non-chrysotile vermiculite surface treatment product was sprayed. These air samples, collected by W. R. Grace, were sent to MAS where state-of-the-art analysis was performed, as requested by W.R. Grace industrial hygienist.<sup>34, 35</sup>

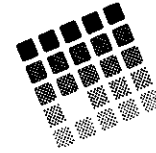
The 1988 testing by Grace is important for the following points:

1. When state-of-the-art air testing was done during the spraying of a Grace surface treatment product, tremolite/actinolite asbestos fibers were detected.

<sup>33</sup> EPA: Guidance for Controlling Asbestos-Containing Materials in Buildings. EPA 560/5-85-024, July 1985.

<sup>34</sup> David J. Curreri, W.R. Grace Construction Products Division, May 3, 1988 letter to William E. Longo, Ph.D.

<sup>35</sup> John J. Henningson, W.R. Grace Construction Products Division, June 9, 1988 letter to William E. Longo,, Ph.D.



2. These tests by W.R. Grace clearly demonstrated that when just their vermiculite product was tested during spray application (non-chrysotile product) significant amounts of airborne asbestos (tremolite/actinolite) was generated into the testing environment.

### Background on the Grace Testing

In 1988 my laboratory was contacted by W.R. Grace Industrial Hygienist, Mr. David Curreri, requesting that we analyze air samples taken during the application of Monokote-5 for the presence of amphibole (tremolite/actinolite) asbestos. Mr. Curreri discussed the problem of detecting small or trace amounts of tremolite/actinolite asbestos in the air samples because of the potential overloading problem associated with the vermiculite and gypsum ingredients in the Monokote-5 fireproofing. Mr. Curreri requested that we analyze the air samples using the indirect sample preparation method and analyze the samples by TEM. We carried out the analysis as requested and our results showed that airborne tremolite/actinolite fibers were detected in the Grace air samples. When these results were reported to the W.R. Grace scientist, the validity and findings of amphibole asbestos in their air samples was never questioned.

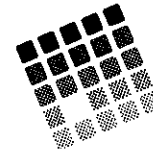
More importantly these results showed that when vermiculite-containing W.R. Grace Construction Products are used they have the potential to release airborne tremolite/actinolite fibers that can contaminate both the person applying these products as well as the surrounding environment where these products were used.

As already discussed, the Canadian chrysotile used by W.R. Grace in their construction products has the potential to expose workers to elevated levels of tremolite/actinolite, and the addition of Libby vermiculite to these products only further increases the risk to workers to airborne tremolite fibers.

### **X. W.R. Grace Exfoliation/Expansion Plants**

Once W.R. Grace mined and processed the vermiculite ore at Libby, Montana, the vermiculite concentrate was shipped to various expansion plants around the country before use in its construction products.<sup>36</sup> In fact, as of 1980 W.R. Grace had 30 vermiculite expansion plants located in 24 different states that received the processed vermiculite ore from the Libby mine. These plants would exfoliate(expand) vermiculite product using high heat in the range of 2000 to 3600 degrees Fahrenheit using vertical furnaces fired by either gas or oil.<sup>36</sup>

<sup>36</sup> *Industrial Minerals and Rocks*, 5<sup>th</sup> Edition, Vol 2, pp 1375-1381, Published by the Society of Mining Engineers, New York, New York, 1983.



As discussed earlier in this report, there has been much dialog and testing in the town of Libby concerning the tremolite/actinolite contamination caused by the W.R. Grace mining operations. In fact, this area in Libby has been deemed an EPA superfund site, and currently EPA is performing both test and cleanup activities.

Besides the Libby mining facility, there are also all the W.R. Grace exfoliation plants that dealt with large amounts of tremolite/contaminated vermiculite material. Even though some of the tremolite was removed from the concentrated ore during the processing (sizing etc.) at the Libby plant, W.R. Grace was never able to fully remove the tremolite/actinolite contaminant before shipment to their expansion plants. A letter from the Executive Vice President of W.R. Grace Construction Products written to the Director of Purchasing at Scotts & Sons in 1980, discusses this point.<sup>37</sup> In the letter Grace makes the following statement:

*"While it is not possible under present state-of-the-art to reduce the tremolite contamination in Libby concentrate to zero, we continue to anticipate achieving the 40 to 50% reduction which we discussed as our objective during our last meeting in March of 1979"*

This Grace memo also provides a breakdown of the average exposure to tremolite/actinolite airborne asbestos levels from 1975 until 1980, and found an average exposure range of 0.2 to 2.8 fibers/cc of asbestos exposure. Based on these results it can be safely assumed that before 1976 these airborne tremolite/actinolite exposures, in these plants, were much higher in magnitude. This is because engineering dust controls were less effective before that time.

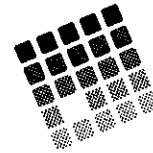
Further evidence of tremolite/actinolite contamination issues at W.R. Grace exfoliation plants is a 1984 publication in the American Review of Respiratory Diseases Journal by Lockey et al.<sup>38</sup> In this publication, Lockey found that at the one of these vermiculite exfoliation plants they estimated a cumulative exposure of tremolite to the work force of between 0.01 to 39 fibers/cc.

The W.R. Grace memo and the Lockey paper clearly show that when W.R. Grace's vermiculite concentrate was shipped to these expansion plants the vermiculite was still significantly contaminated with fibrous tremolite/actinolite causing airborne asbestos exposures to the workers at these plants. However, besides tremolite exposure to the expansion plant workers, there would be expected significant environmental exposure of

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<sup>37</sup> E.S. Wood, W.R. Grace Construction Products Division, October 14, 1980 letter to S.V. Chamberlain, Director of Purchasing, O.M. Scott & Sons.

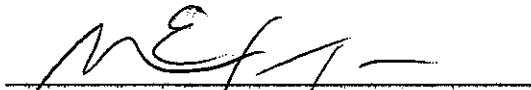
<sup>38</sup> Lockey, J.E., Brooks, S.M., Jarabek, A.M., Khoury, P.R., McKay, R.T., Carson, A., Morvison, J.A., Wiot, J.F. and Spitz, H.B. "Pulmonary Changes After Exposure to Vermiculite Contaminated with Fibrous Tremolite", Am. Rev. Respir. Dis., 129, pp 952-958, 1984.



tremolite/actinolite to the plant facilities and surrounding area.<sup>39</sup> That, in my opinion, still needs to be addressed.

Again, as stated in this report, the city of Libby, Montana has received much publicity for their tremolite contamination problems caused by W.R. Grace's vermiculite mining operations but little has been mentioned of this same problem with the various W.R. Grace expansion plants located in other cities besides Libby, Montana. These other W.R. Grace exfoliation/expansion plants would be expected to have significant tremolite/actinolite contamination that would require extensive cleanup similar in nature to the ongoing EPA effort in Libby, Montana.

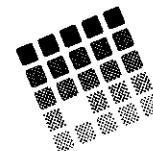
All the opinions that I have expressed in this report are all held to a reasonable degree of scientific certainty and I reserve the right to modify this report if additional information becomes available in the future.

  
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William E. Longo, Ph.D.

  
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Date

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<sup>39</sup> U.S. Department of Health and Human Services Agency for Toxic Substances and Disease Registry Division of Health Assessment and consultation Summary Report, Exposure to Asbestos-Containing Vermiculite from Libby, Montana, at 28 Processing Sites in the United States, October 29, 2008.



## VITAE

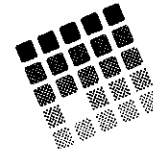
William Edward Longo, Ph.D.  
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### EDUCATION

October 1980 to December 1983	Received Doctor of Philosophy in Materials Science and Engineering, University of Florida.
June 1979 to October 1980	Completed the requirements for a Master of Science in Materials Science and Engineering, University of Florida.
September 1972 to Microbiology, June 1977	Received Bachelor of Science degree; Major in  Minor in Chemistry, University of Florida.

### PROFESSIONAL WORK HISTORY

September 1987 to Present	President of MAS, LLC (previously Materials Analytical Services Inc) Suwanee, Georgia
August 1987 to February 1988	President and Founder of Longo Microanalytical Services, Inc., Gainesville, Florida.
October 1983 to August 1987	President and Founder of Micro Analytical Laboratories, Inc., Gainesville, Florida.
March 1985 to December 1987	Visiting Assistant Professor; University of Florida, Department of Materials Science and Engineering.
August 1983 to March 1985	Post Doctoral Associate; University of Florida, Department of Materials Science and Engineering.



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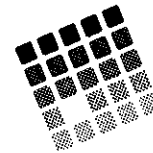
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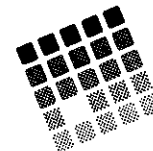
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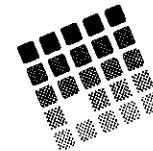
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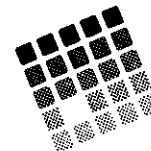
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#### **ACTIVITIES AND ORGANIZATIONS**

- \* Member of Environmental Protection Agency Workshop on Sampling and Analysis of Asbestos in Settled Dusts, July 1989.
- \* Member of Environmental Protection Agency Peer Review Group for the Asbestos Engineering Program, 1987 to present.
- \* Vice-Chairman of the National Asbestos Council Analytical Subcommittee on Transmission Electron Microscopy 1987-1988.
- \* Chairman of National Asbestos Council Analytical Subcommittee on Transmission Electron Microscopy 1988-1989.
- \* Member of ASTM D-22-05 Subcommittee for Indoor Air Pollution.

#### **LECTURES AND COURSES INSTRUCTED**

Longo, W.E. "Electron Microscopy for Industrial Hygiene Applications" American Industrial Hygiene Conference Professional Development Course, Atlanta GA, May 2004.

Longo, W. E. "Settled Dust: Asbestos and Other Particulates" Georgia Institute of Technology Seminar, August 1991.

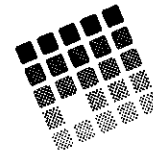
Longo, W. E. "The Role of the Laboratory Manager, Quality Assurance Officer and the Analyst for NIST Accreditation" Georgia Institute of Technology, Transmission Electron Microscopy Asbestos Accreditation Seminar, August 1989.

Longo, W. E. 24th Annual Meeting of the Microbeam Analysis Society, "Asbestos Analysis Session", Asheville, North Carolina, July 1989, (Session Co-Chairman).

Longo, W. E. "Fundamentals of Asbestos Analysis by TEM" Institute in Materials Science State University of New York. New Paltz, New York, October 1988 (Course Director).

Longo, W. E. "TEM Imaging/Photography" Georgia Institute of Technology, Transmission Electron Microscopy Asbestos Analysis Course, June 1988.

Longo, W. E. "Laboratory Preparation of Polycarbonate Filters for TEM Analysis" Georgia Institute of Technology, Advanced Transmission Electron Microscopy Asbestos Analysis Course, February 1988.



Longo, W. E. "Transmission Electron Microscopy Laboratory Set-Up" Georgia Institute of Technology, Advanced Transmission Electron Microscopy Asbestos Analysis Course, February 1988.

Longo, W. E. "Laboratory Analysis of Asbestos" Hall-Kimbrell Seminar in Asbestos Abatement in the State of Florida, January 1988.

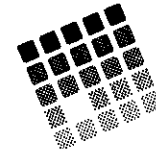
Longo, W. E. "Air Sample Preparation and Analysis by TEM" Georgia Institute of Technology, Clearance Testing for Asbestos: AHERA Regulations, October 1987.

Longo, W. E. "Asbestos Air Sample Analysis by Transmission Electron Microscopy" American Industrial Hygiene Conference Professional Development Course, Montreal, Canada, May 1987.

Longo, W.E. "Asbestos Air Sample Analysis by Transmission Electron Microscopy" American Industrial Hygiene Conference Professional Development Course, Dallas, TX, May 1986.

#### **PROFESSIONAL MEMBERSHIPS**

American Industrial Hygiene Association	1985 to Present
American Society for the Testing of Materials	1987 to Present
American Society of Materials	1994 to Present
National Asbestos Council	1984 to 1993
Environmental Information Association	1993 to Present
Materials Research Society	1988 to Present
Electron Microscopy Society Association	1988 to Present
Microbeam Analysis Society	1988 to Present
New York Academy of Science	1985 to 1987 1989 to 1994
Air Pollution Control Association	1985 to 1987



National Institute of Building Sciences	1991 to Present
The Society for Ultrastructural Pathology	1996 to Present
American Society of Heating, Refrigerating and Air-Conditioning Engineers	1996 to Present
The American College of Forensic Examiners – Diplomat of Forensic Engineering Technology	1999 to Present
American Conference of Governmental Industrial Hygienist (ACGIH) Associate Member	2006 to Present



# INVOICE

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**MAS, LLC**  
3945 Lakefield Court  
Suwanee, Georgia 30024  
(770) 866-3200  
FAX (770) 866-3259  
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Attn. Accounts Payable  
1 Thomas Circle N.W.  
Washington, DC 20005 USA

Invoice Date: 12/29/2008  
Invoice Number: 0000013581  
Contact: Nathan D. Finch  
Expert: 14-Longo  
PO Number:  
Project#: 14120834

	Units	Rate	Extended Amt
14 - Expert Report	4.000	300.000	1,200.00
Case Name: W.R. Grace			
W.R. Grace Asbestos-Containing Construction Products:			
A Review of Asbestos Types, Source and Libby Vermiculite Expert Report			
4 Hours @ \$300/hr			

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**William E. Longo, Ph.D. Testimony**  
**12/04 to 12/08**



WEL	12/08/04	Rafael Hanys vs. Metropolitan Life Ins. Co., et al.
WEL	12/10/04	Rafael W. Hanys, et al vs. Metropolitan Life Ins.
WEL	12/16/04	James Craven, et al. vs. Garlock Inc. et al.
WEL	12/17/04	Salinas vs. Zurn
WEL	12/20/04	Wayne Brown, et al., vs. Owens Illinois, et al.
WEL	12/22/04	Janet Krough, et al. vs. Garlock Inc., et al.
WEL	01/04/05	David Devries et al. vs. American Built Right, et al.
WEL	01/12/05	Lippincott vs. Moldex-Metric, Inc. et al.
WEL	01/28/05	Eck, Borriello, Tombor vs. A.W. Chesterton, et al.
WEL	02/21/05	David Fowers, et al vs. 3M Co., et al.
WEL	03/01/05	Bostick et al vs. Georgia Pacific Corp.
WEL	03/03/05	Leech vs. 3M Co., et al.
WEL	03/23/05	Kathy Roberson, et al. vs. Quigley Co., et al.
WEL	03/24/05	Darrel McWard, et al. vs. Michael Wojitas, et al.
WEL	04/04/05	April 2005 Meso Trial Group
WEL	04/05/05	George Bouhanna vs. 128 Imports, et al.
WEL	04/07/05	Mary Cannon, et al. vs. Guard-Line, Inc., et al.
WEL	04/08/05	Stephanie Pagano vs. A.W. Chesterton et al.
WEL	04/13/05	Ava Nell Dexter, et al. vs. Triangle Insulation & Sheetmetal Co., et al.
WEL	04/18/05	Mary Poore, et al vs. Alcoa, et al.
WEL	04/26/05	Eugene Konechny vs. A.W. Chesterton Co. et al.
WEL	05/23/05	In re: Asbestos Litigation
WEL	06/06/05	Joe Thomas James, et al. vs. Quigley Co., Inc., et al
WEL	07/08/05	James Nisselius, et al. vs. A.W. Chesterton Co.
WEL	07/11/05	Joseph O'Halloran vs. AC&S, Inc., et al.
WEL	07/26/05	Susan Ingraham, et al, vs. Anchor Packing Co., et al.
WEL	08/10/05	Mary Evans vs. A.W. Chesterton, Inc., et al.
WEL	08/22/05	Linda Ann McDowell vs. A.W. Chesterton
WEL	08/25/05	Salyer/Coca/Hunziker/Starr
WEL	09/09/05	Paul Sykes, et al., vs. American Standard Inc., et al.
WEL	09/16/05	Lawrence Haak, et al. vs. A.W. Chesterton, et al.
WEL	09/26/05	Mark Grisez, et al. vs. AC&S
WEL	09/29/05	Ham vs. A K Steel
WEL	10/06/05	Lucas Hicks vs. Garlock Sealing, et al.
WEL	10/11/05	Joan & David Salyer vs. Kaiser Gypsum
WEL	10/21/05	Henrietta Espinoza, et al. vs. AC&S Inc., et al.
WEL	10/21/05	Martha White Beaman vs. Quigley Co.
WEL	10/28/05	Arthur Chaney, et al and Raymond Cowart, et al.
WEL	11/11/05	George Thomas vs. General Motors, Corp.
WEL	11/29/05	Betty Rowan vs. Crown Cork & Seal Co., Inc., et al.
WEL	12/07/05	Joseph Mallia vs. Bennett Auto Supply Inc., et al.
WEL	02/22/06	Anita Douglas O'Connell et al vs. A.W. Chesterton, Inc. et al.
WEL	03/03/06	Wanda T. Jones et al. vs. John Crane, Inc.
WEL	06/08/06	John McNamara vs. Bondex International
WEL	07/21/06	Lewis Wright, et al. vs. Honeywell International, Inc., et al.
WEL	08/01/06	Conrad Beauchamp et al. vs. Allis-Chalmers et al.
WEL	09/26/06	Charles Palmore, et al vs. ACE Hardware Corp. et al.
WEL	12/01/06	Leslie Victor Duke et al vs. A.W.Chesterton Co., et al.
WEL	01/04/07	Glenn Riley vs. Aqua-Chem, Inc. et al.

**William E. Longo, Ph.D. Testimony**  
**12/04 to 12/08**



WEL	01/10/07	Emma Josephine Maloney Martin, et al vs. Quigley Co., Inc., et al.
WEL	01/22/07	Jay Daniel Mikulencak, et al. vs. TXU Mining Co., LP, et al.
WEL	01/23/07	In re: Asbestos Litigation - Cote Trial Group
WEL	02/21/07	Bennett Scott and Christine Hoser vs. International Truck and Engine Corp. et al.
WEL	02/28/07	Sandra Kay Oney, et al. vs. Garlock Sealing Technologies, et al.
WEL	03/01/07	Sandra K. Oney et al. vs. John Crane, Inc.
WEL	03/12/07	Alice Suit, et al. vs. Garlock Sealing Technologies, LLC et al.
WEL	03/19/07	Robert Davish, Howard Edmundson vs. A.W. Chesterton, Inc., et al
WEL	03/22/07	In Re: Chapter 11 W. R. Grace & Co., et al.
WEL	04/11/07	In Re: Kanawha Co. May 2007 Trial Group, Sartin/Songer vs. A & I Co., et al.
WEL	04/16/07	Larry Prentis Rice, et al. vs. Georgia Pacific Corp., et al.
WEL	04/19/07	Kenneth and Sandra Balthazar vs. A.W. Chesterton Co., et al.
WEL	05/01/07	Larry McWhorter, et al. vs. A.W. Chesterton Co., et al.
WEL	05/01/07	Michael Donald Edwards vs. Quigley Company, Inc.
WEL	05/03/07	Jack Pounds vs. Alfa Laval, Inc.
WEL	05/04/07	Milton Darwin Knutson, et al. vs. Allis-Chalmers Corp, et al.
WEL	06/04/07	Linda Shake, et al. vs. Quigley Co. Inc., et al.
WEL	08/10/07	In Re: Hawaii State Asbestos Cases
WEL	08/14/07	Joseph G. Freitas, et al. vs. Honeywell International, Inc.
WEL	08/14/07	Susan Buttitta, et al. vs. Allied Signal, Inc., et al.
WEL	08/28/07	Loretta Sanchez, et al. vs. Owens Illinois, et al.
WEL	08/28/07	Sidney Berger, et al. vs. AC&S Inc., et al.
WEL	09/07/07	Audrey Streng and James Streng vs. American Standard, Inc., et al.
WEL	09/24/07	James Michael Angelo, vs. A.W. Chesterton, Inc., et al
WEL	09/25/07	Nancy Murray, et al. vs. Guardline Inc., et al.
WEL	09/27/07	Oliver Smith et al vs. Crane Co., et al
WEL	10/01/07	Emma Josephine Maloney Martin, et al. vs. Quigley Co., Inc., et al.
WEL	10/03/07	Preston Carpenter, et al. vs. A.W. Chesterton, Inc., et al.
WEL	10/04/07	Carl Amick, et al., vs. ABB Lummus Global et al.
WEL	10/09/07	Oliver D. Smith et al. vs. Crane Co., et al. Vol. II
WEL	10/11/07	Ora J. King, Executor of the Estate of James King, Deceased vs. John Crane, Inc., et al
WEL	10/19/07	Colleen Lemberger, et al. vs. The Anchor Packing Co., et al.
WEL	10/20/07	In Re Asbestos Litigation Moses Trial Group
WEL	10/23/07	Chapter 11 in Re: W.R. Grace Co., et al, Debtor.
WEL	11/01/07	Bobby Dale James et al. vs. The Sherwin Williams Co., et al.
WEL	11/01/07	Oliver D. Smith et al vs. Crane Co., et al.
WEL	11/19/07	David Roy Taylor vs. Saberhagen Holdings, Inc. et al.
WEL	11/19/07	Roy Broz and Adelaine Broz vs. A.W. Chesterton Co., et al.
WEL	11/20/07	Castle Co. DE January '08 Trial Group
WEL	11/26/07	Robert Griffiths vs. Garlock Sealing Technologies, et al.
WEL	12/05/07	Alyce Winnemueller, et al. vs. Employers Insurance Company of Wausau, et al.
WEL	12/07/07	Donal Ballou and Betty Ballou vs. A.W. Chesterton Co., et al.
WEL	12/14/07	Janice Taliaferro, et al. vs. Georgia Pacific Corp., et al.
WEL	12/18/07	Tommy Ray Tarver and Florence Tarver vs. Georgia Pacific Corp., et al.

**William E. Longo, Ph.D. Testimony**  
**12/04 to 12/08**



WEL	01/08/08	Asbestos Personal Injury Litigation January 2008 Trial Group
WEL	01/08/08	In Re: Kanawha Co. May 2008 Trial Group, Jamron & Rhodes
WEL	02/01/08	Susan Buttitta, et al. vs. Allied Signal, Inc., et al.
WEL	02/01/08	Willis N. Whisnant, Jr., et al. vs. E.I. Du Pont De Nemours & Co., et al.
WEL	02/04/08	Rosemary Smith et al. vs. Elementis Chemicals, Inc. et al.
WEL	02/06/08	Mary Ann Jester, et al. vs. Union Carbide Corp., et al.
WEL	02/21/08	Elreece McKinney, et al. vs. Quigley Co., Inc., et al.
WEL	02/26/08	Gerald Nickell vs. A.W. Chesterton, Co., et al.
WEL	03/01/08	Caryl Richardson et al. vs. E.I. du Pont de Nemours and Co.
WEL	03/06/08	Judy L. Clauson et al. vs. Atlas Foundry Liited Partnership, et al.
WEL	03/19/08	Charles Webb, et al. vs. AC&S, Inc. et al.
WEL	04/01/08	Nancy S. Morton et al vs. Exxon Mobil Corp.
WEL	04/09/08	James Michael Angelo, deceased, vs.. 3M Co., et al.
WEL	04/14/08	Colleen Lemberger, et al. vs. Anchor Packing Co. et al
WEL	04/28/08	Benson L. Bailess and Alnet Bailess vs. Kaiser Gypsum Co., Inc., et al.
WEL	05/05/08	Allen Beadle and Bonnie L. Beadle, vs. Ametek, Inc., et al.
WEL	05/06/08	Anthony D'Apice, et al., vs. AC&S, Inc., et al. (Cases affected: Riley/Schylaske)
WEL	05/09/08	David Edwin Timmons vs. Bondex International Inc., et al.
WEL	05/28/08	Cleopatra Penny Bennett, et al. vs. A.W. Chesterton Co., et al.
WEL	05/28/08	David Lee Stangle, et al. vs. A.W. Chesterton Co., et al.
WEL	05/30/08	Ronald Rome, et al. vs. Abex Corp., et al.
WEL	06/05/08	Anita Burt, et al. vs. A.W. Chesterton, et al.
WEL	06/06/08	Donald W. Chambers vs. Saberhagen Holdings, Inc., et al.
WEL	06/18/08	Robert E. Isaacs vs. Georgia Pacific Corp., LLC, et al.
WEL	07/10/08	Cowan vs Crown Court
WEL	08/04/08	Carson Broyles, et al., vs. AC&S, Inc., et al. Case Affected: Lenora Williams-Walker
WEL	08/07/08	Earnest Trial Group In Re: Asbestos Litigation State of Delaware
WEL	08/08/08	Sally Ivanoff, individually and as Personal Representative of the Estate of Clifford Nyman, Deceased, vs. Allis-Chalmers Product Liability Trust, et al.
WEL	08/14/08	Ruby Ann Withers vs. GAF Corp., et al.
WEL	08/15/08	Charles Fergason & Nancy Fergason vs. TXU Corporation, et al.
WEL	08/25/08	John O. Koonce vs. Garlock Sealing Technologies, et al.
WEL	09/02/08	Lois Stromberg Personal Representative of the Estate of Raymond Stromberg vs. Ametek, Inc., et al.
WEL	09/15/08	Marcello Zamoja Garcia & Francis Garcia vs. Ametek, Inc., et al.
WEL	09/26/08	Darlene Parker, et al., vs. 3-M Company, et al.
WEL	09/29/08	Stephen Branham, as Personal Representative of the Estate of Phyllis Mae Branham (deceased) and Harold Dean Branham, Sr., (deceased) vs. A W Chesterton Co., et al.
WEL	10/13/08	David William Kytola and Pamela Jean Kytola vs Saberhagen Holdings, Inc. et al.
WEL	10/21/08	George Jones, et al., vs AC&S Inc. et al. Case Affected: Kenneth Carfine, Sr.

**William E. Longo, Ph.D. Testimony**  
**12/04 to 12/08**



WEL	11/05/08	John Michael Nolen & Sarah Nolen vs. Allied Mineral Products, Inc., et al.
WEL	11/10/08	Adam Merkle vs Advocate Mines, Limited, et al.
WEL	12/02/08	Randall Trial Group In Re: Asbestos Litigation State of Delaware
WEL	12/03/08	Arlen Cecil Kiper, II & Ann Kiper vs. A W Chesterton Co., et al.
WEL	12/19/08	Valerie Dufour, et al. vs. AGCO Corporation, et al.